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(54) **DUAL SIDED BRACKET IN STEERING COLUMN FOR ENERGY ABSORPTION ROBUSTNESS**

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See application file for complete search history.

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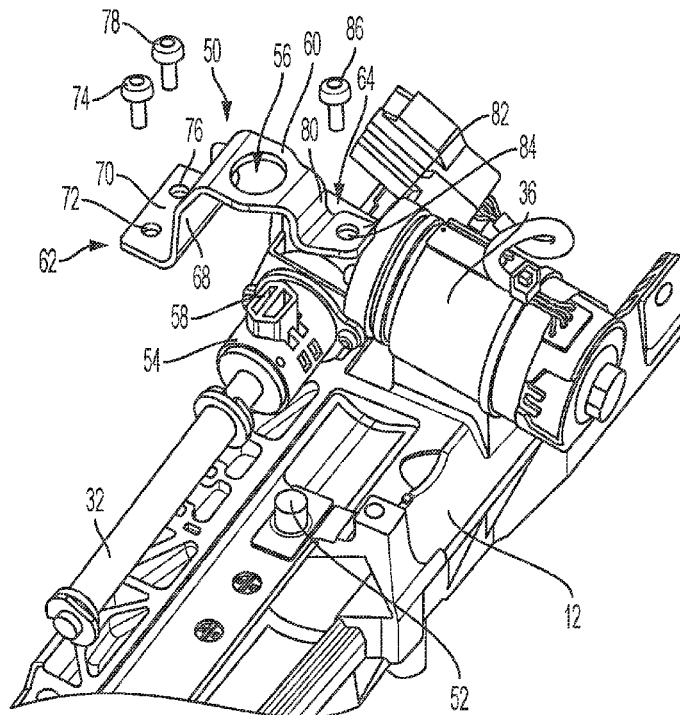
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(57) **ABSTRACT**

A telescope mechanism for a steering column includes a jacket. The telescope mechanism also includes a telescope actuator housing mounted to the jacket. The telescope mechanism further includes a capture bracket positioned on the telescope actuator housing and mechanically fastened to the jacket on a first side of the telescope actuator housing and on a second side of the telescope actuator housing.

14 Claims, 4 Drawing Sheets



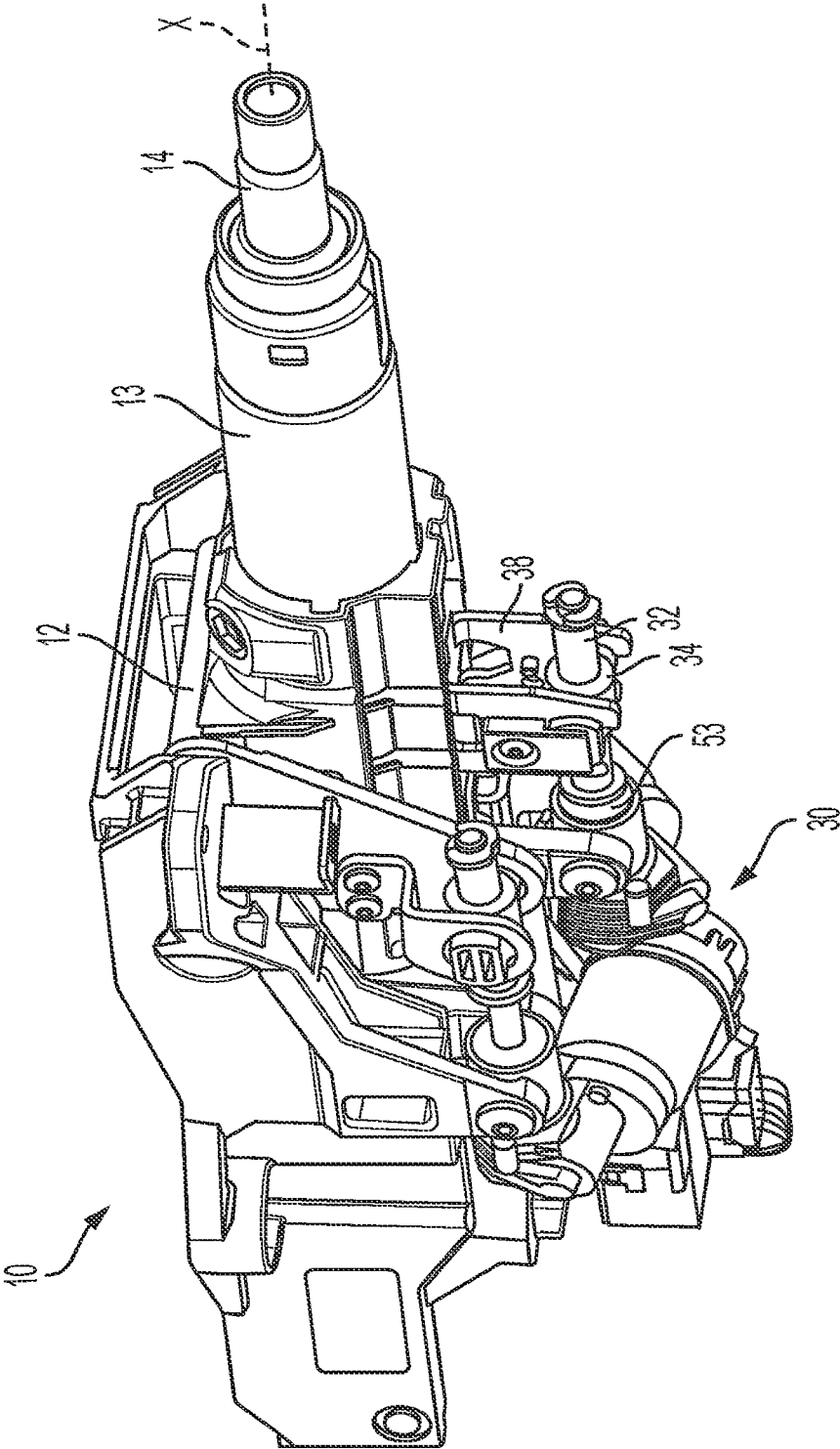


FIG. 1

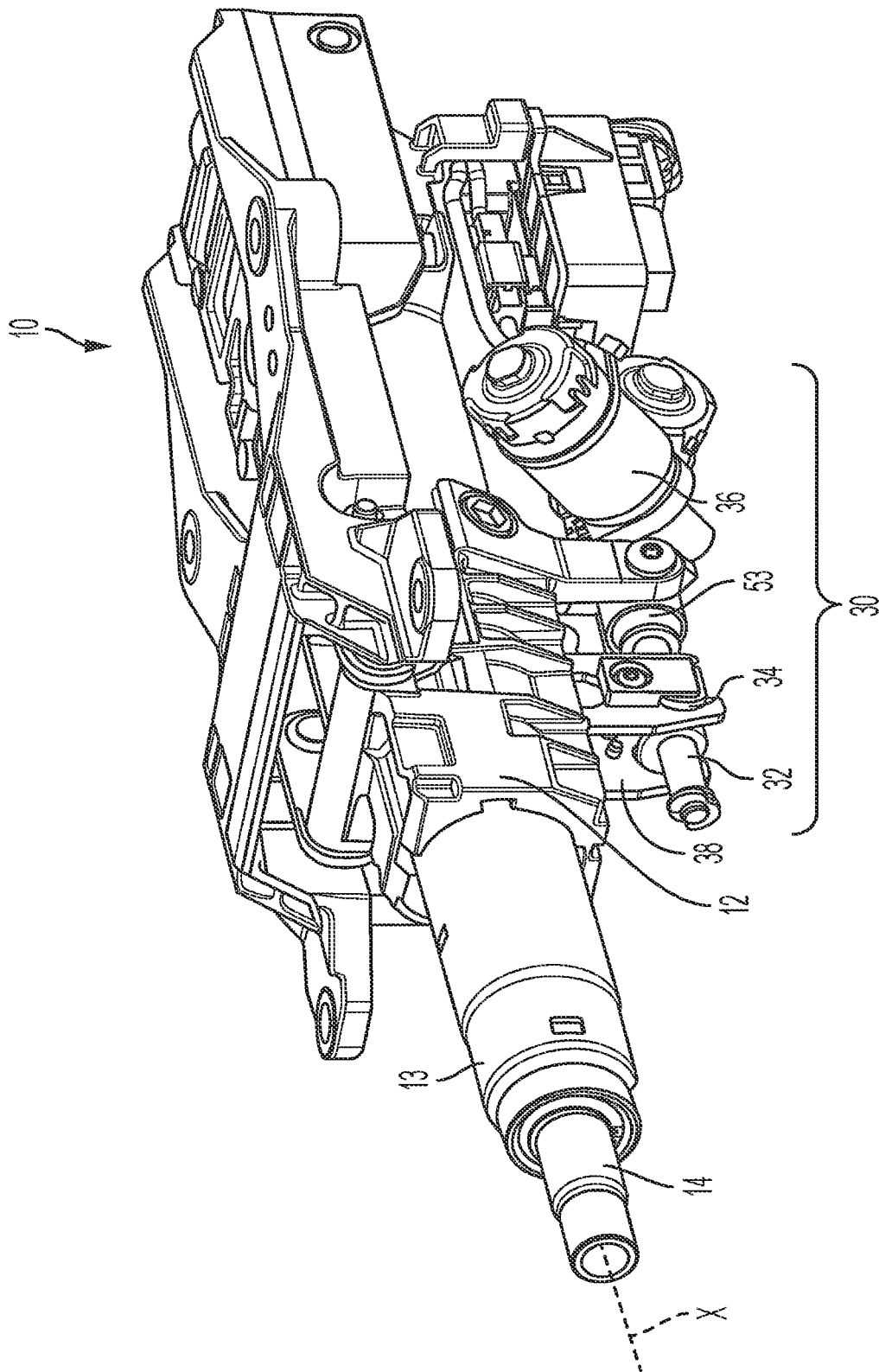


FIG. 2

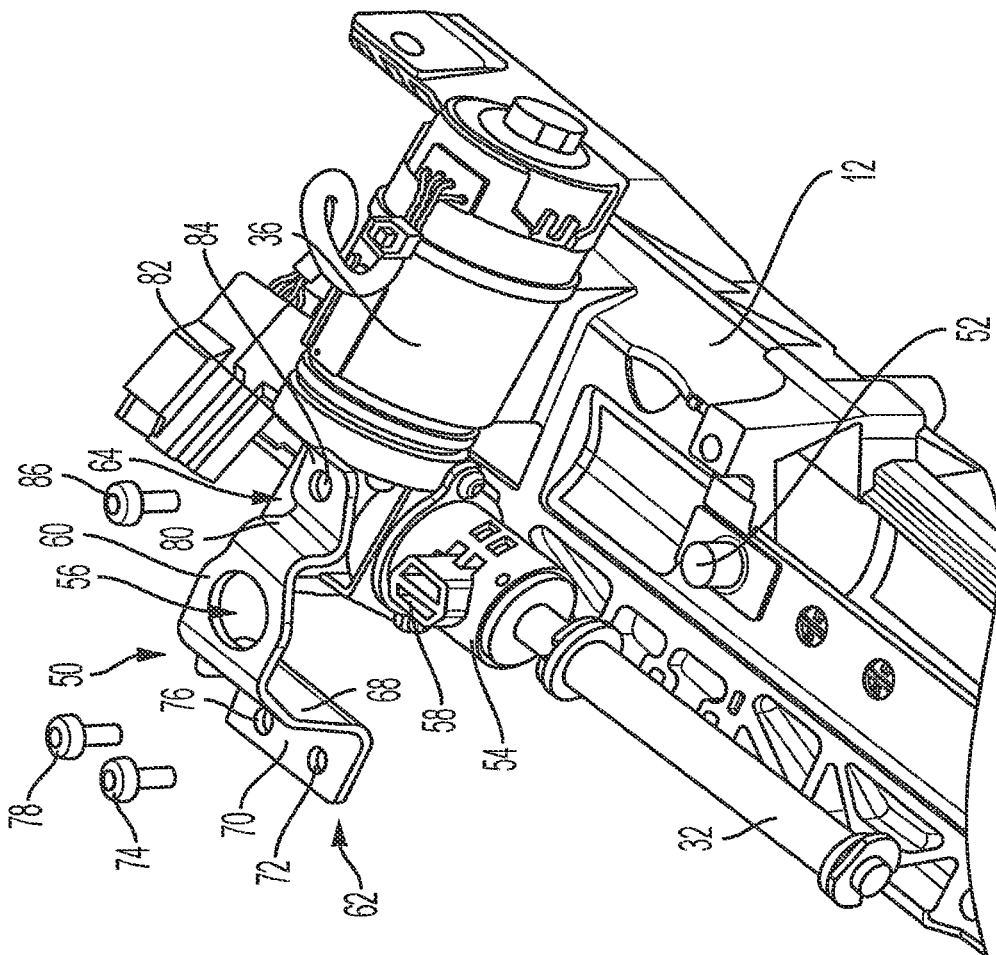


FIG. 3

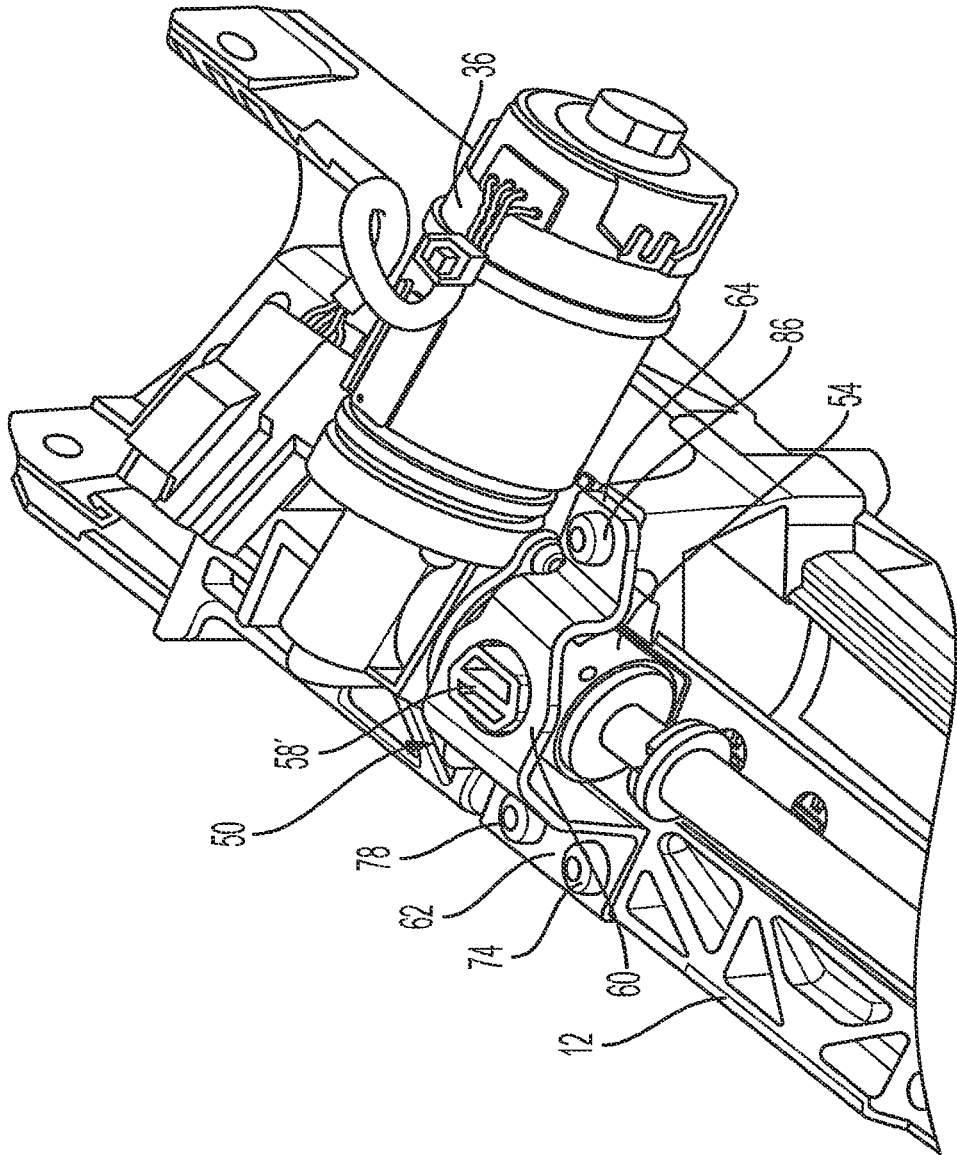


FIG. 4

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DUAL SIDED BRACKET IN STEERING COLUMN FOR ENERGY ABSORPTION ROBUSTNESS

FIELD OF THE INVENTION

The embodiments described herein relate to vehicle steering systems and, more particularly, to a dual sided bracket for energy absorption robustness.

BACKGROUND

A steering column assembly of a vehicle may be adjustable in a rake (tilt) direction and/or in a telescoping direction. Each of these adjustments may be carried out with respective power assemblies or mechanisms. The telescope drive system is mounted rigidly at one location, while another location moves in a linear direction, thus driving the component it is fixed to, resulting in a desired telescope travel. During a collapse event (e.g., energy absorption event) of some steering columns, the lower jacket tends to deflect or become damaged. This is not a desirable outcome.

SUMMARY

According to one aspect of the disclosure, a telescope mechanism for a steering column includes a jacket. The telescope mechanism also includes a telescope actuator housing mounted to the jacket. The telescope mechanism further includes a capture bracket positioned on the telescope actuator housing and mechanically fastened to the jacket on a first side of the telescope actuator housing and on a second side of the telescope actuator housing.

According to another aspect of the disclosure, a steering column assembly includes a lower jacket. The steering column assembly also includes an upper jacket in telescoping engagement with the lower jacket. The steering column assembly further includes a telescope mechanism. The telescope mechanism includes a telescope actuator housing mounted to the lower jacket, the telescope actuator housing at least partially containing a telescope actuator therein. The telescope mechanism also includes a lead screw operatively coupled to the upper jacket and driven by the telescope actuator to selectively move the upper jacket relative to the lower jacket. The telescope mechanism further includes a capture bracket positioned on the telescope actuator housing and mechanically fastened to the lower jacket on a first side of the telescope actuator housing and on a second side of the telescope actuator housing.

These and other advantages and features will become more apparent from the following description taken in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter that is regarded as the invention is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other features, and advantages of the invention are apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a first side of a steering column assembly;

FIG. 2 is a perspective view of a second side of the steering column assembly;

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FIG. 3 is a perspective view of a dual sided capture bracket shown disassembled from the steering column assembly; and

FIG. 4 is a perspective view of the dual sided capture bracket shown assembled to the steering column assembly.

DETAILED DESCRIPTION

Referring now to the Figures, where the invention will be described with reference to specific embodiments, without limiting same, illustrated are embodiments of a dual sided capture bracket for a telescope mechanism of a steering column.

FIGS. 1 and 2 illustrate a steering column assembly generally indicated with numeral 10. The steering column assembly 10 is for a vehicle and extends along a longitudinal axis X. The steering column assembly 10 may be adjustable in a telescopic direction generally parallel with the longitudinal axis X (i.e., adjustable along the longitudinal axis X), and may be adjustable in a rake/tilt direction in some embodiments. The steering column assembly 10 includes a lower jacket 12, an upper jacket 13, and a steering shaft 14 extending along the longitudinal axis X. The steering shaft 14 and the upper jacket 13 are operatively coupled to each other and disposed in telescoping engagement with the lower jacket 12. In other words, the steering shaft 14 has a portion disposed within the upper jacket 13 and a portion disposed within the lower jacket 12. The upper jacket 13 has a portion extending into the lower jacket 12 and is translatable therein.

A telescope actuator assembly 30 is provided to facilitate powered telescope adjustments of the upper jacket 13 and the steering shaft 14. The telescope actuator assembly 30 includes a leadscrew 32 having a nut 34 threaded thereto. A motor 36 rotatably drives the leadscrew 32 via a telescope actuator 53 to translate the nut 34 there along. The nut 34 is operatively coupled to the upper jacket 13 with a telescope drive bracket 38, such that linear movement of the nut 34 along the leadscrew 32 drives the upper jacket 13 to and from different telescope positions.

In the illustrated embodiments, the above-described components of the telescope actuator assembly 30 are substantially positioned on a lower side of the steering column assembly 10. However, it is contemplated that other orientations and positions are desirable.

Referring now to FIGS. 3 and 4, a capture bracket is shown and is generally referenced with numeral 50. The capture bracket 50 is operatively coupled to the lower jacket 12 with at least two fasteners, as described in detail herein. A telescope actuator housing 54 is located relative to the lower jacket 12 with a mounting post 52 extending from the lower jacket 12, as shown well in the disassembled condition of FIG. 3. The mounting post 52 is shown as a cylindrical structure integrally formed with the lower jacket 12, but it is to be appreciated that the mounting post 52 may be formed in other geometric configurations.

The capture bracket 50 is secured to the telescope actuator housing 54 which is mounted to the leadscrew 32 and is driven by the motor 36. In the illustrated embodiment, the capture bracket 50 defines a main opening 56 which receives a protrusion 58 extending from the telescope actuator housing 54. However, in other embodiments, a recess may be provided within the capture bracket 50 to position the capture bracket 50 on the telescope actuator housing 54.

The main opening 56 is defined within a body segment 60 of the capture bracket 50. A first leg 62 extends from a first side of the body segment 60 and a second leg 64 extends

from a second side of the body segment **60**—opposite the first side of the body segment **60**. At least a portion of each of the first leg **62** and the second leg **64** extends to be located on opposite sides of the telescope actuator housing **54** in an assembled condition. In the illustrated embodiment, the first leg **62** and the second leg **64** are each of a substantially L-shaped configuration. In particular, the first leg **62** includes a first leg first portion **68** and a first leg second portion **70**. The first leg first portion **68** extends directly from the first side of the body segment **60** and the first leg second portion **70** extends directly from the first leg first portion **68**. The second leg first portion **70** defines a first fastener hole **72** configured to receive a first fastener **74** and a second fastener hole **76** to receive a second fastener **78**. The first fastener **74** and the second fastener **78** may be screws, bolts or the like, and are threaded into holes of the lower jacket **12** to secure the first leg **62** of the capture bracket **50** to the lower jacket **12**.

Similarly, the second leg **64** includes a second leg first portion **80** and a second leg second portion **82**. The second leg first portion **80** extends directly from the second side of the body segment **60** and the second leg second portion **82** extends directly from the second leg first portion **80**. The second leg second portion **82** defines a third fastener hole **84** configured to receive a third fastener **86**. The third fastener **86** may be a screw, bolt or the like, and is threaded into a hole of the lower jacket **12** to secure the second leg **64** of the capture bracket **50** to the lower jacket **12**. While the embodiment described above and illustrated includes two fasteners associated with the first leg **62** and a single fastener associated with the second leg **64**, it is to be understood that a single fastener could be associated with the first leg **62** and more fasteners could be associated with the second leg **64** in any contemplated combination so long as at least one fastener is disposed on opposing sides of the capture bracket **50**, and therefore on opposing sides of the telescope actuator housing **54**.

In operation, an energy absorption assembly (not shown) that is operatively coupled to the upper jacket **13** absorbs energy during a collapse event of the steering column assembly **10**. A reaction point for this energy absorption is the capture bracket **50**, the telescope actuator housing **54** and indirectly the lower jacket **12**. By providing at least one attachment point for the capture bracket **50** to the lower jacket **12** on both lateral sides of the telescope actuator housing **54**—as opposed to a cantilevered attachment—the capture bracket **50** does not deflect due to redistribution of the energy absorption loading to at least one additional reaction point on the lower jacket **12**. This eliminates lower jacket fractures and prevents the telescope actuator housing **54** from disengaging from the mounting post **52** of the lower jacket **12** during collapse. Therefore, the capture bracket **50** ensures that the telescope actuator housing **54** and associated components of the lower jacket **12** are robustly stabilized during an energy absorption event.

While the invention has been described in detail in connection with only a limited number of embodiments, it is to be readily understood that the invention is not limited to such disclosed embodiments. Rather, the invention can be modified to incorporate any number of variations, alterations, substitutions or equivalent arrangements not heretofore described, but which are commensurate with the spirit and scope of the invention. Additionally, while various embodiments of the invention have been described, it is to be understood that aspects of the invention may include only some of the described embodiments. Accordingly, the invention is not to be seen as limited by the foregoing description.

Having thus described the invention, it is claimed:

1. A telescope mechanism for a steering column comprising:
 - a jacket;
 - a telescope actuator housing mounted to the jacket; and
 - a capture bracket positioned on the telescope actuator housing and mechanically fastened to the jacket on a first side of the telescope actuator housing and on a second side of the telescope actuator housing, wherein the first side and the second side of the telescope actuator housing are on opposite sides of the telescope actuator housing.
2. The telescope mechanism of claim 1, wherein the capture bracket comprises:
 - a main body segment;
 - a first leg extending from the main body segment and mechanically fastened to the jacket on the first side of the telescope actuator housing; and
 - a second leg extending from the main body segment and mechanically fastened to the jacket on the second side of the telescope actuator housing.
3. The telescope mechanism of claim 2, wherein the capture bracket is positioned on the telescope actuator housing with a protrusion extending from the telescope actuator housing extending through a main opening defined by the main body segment of the capture bracket.
4. The telescope mechanism of claim 1, wherein the first leg defines a first fastener opening and a second fastener opening, the first fastener opening receiving a first fastener therethrough to secure the first leg to the jacket, the second fastener opening receiving a second fastener therethrough to secure the first leg to the jacket.
5. The telescope mechanism of claim 4, wherein the second leg defines a third fastener opening for receiving a third fastener therethrough to secure the second leg to the jacket.
6. The telescope mechanism of claim 1, wherein the telescope actuator housing is mounted to the jacket on a mounting post extending from the jacket.
7. The telescope mechanism of claim 6, wherein the mounting post is cylindrical.
8. A steering column assembly comprising:
 - a lower jacket;
 - an upper jacket in telescoping engagement with the lower jacket; and
 - a telescope mechanism comprising:
 - a telescope actuator housing mounted to the lower jacket, the telescope actuator housing at least partially containing a telescope actuator therein;
 - a lead screw operatively coupled to the upper jacket and driven by the telescope actuator to selectively move the upper jacket relative to the lower jacket; and
 - a capture bracket positioned on the telescope actuator housing and mechanically fastened to the lower jacket on a first side of the telescope actuator housing with a first fastener and a second fastener, and the capture bracket mechanically fastened to the lower jacket on a second side of the telescope actuator housing with a third fastener, wherein the axis of each of the first fastener, the second fastener and the third fastener are parallel to each other and perpendicular to a longitudinal axis of the lower jacket.
9. The steering column assembly of claim 8, wherein the capture bracket comprises:

a main body segment;
a first leg extending from the main body segment and
mechanically fastened to the jacket on the first side of
the telescope actuator housing; and
a second leg extending from the main body segment and 5
mechanically fastened to the jacket on the second side
of the telescope actuator housing.

10. The steering column assembly of claim **8**, wherein the
first leg defines a first fastener opening and a second fastener
opening, the first fastener opening receiving the first fastener 10
therethrough to secure the first leg to the jacket, the second
fastener opening receiving the second fastener therethrough
to secure the first leg to the jacket.

11. The steering column assembly of claim **10**, wherein
the second leg defines a third fastener opening for receiving 15
the third fastener therethrough to secure the second leg to the
jacket.

12. The steering column assembly of claim **8**, wherein the
telescope actuator housing is mounted to the jacket on a
mounting post extending from the jacket. 20

13. The steering column assembly of claim **12**, wherein
the mounting post is cylindrical.

14. The steering column assembly of claim **8**, wherein the
capture bracket is positioned on the telescope actuator
housing with a protrusion extending from the telescope 25
actuator housing extending through a main opening defined
by the main body segment of the capture bracket.

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